

# *Some Helpful Hints*

FOR RIDERS OF

# B.S.A.

2.49 h.p.

## MOTOR BICYCLES

SINGLE CYLINDER MODELS

"B 26" and "B 26" DE LUXE.



## B.S.A. CYCLES LIMITED.

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**BARNSTORMERS.CO.NZ**

FORK LINKS  
Lubricate every  
250 miles.

STEERING  
HEAD  
Oil every  
250 miles.

CONTROL  
LEVERS  
Oil every  
250 miles.

CLUTCH  
OPERATING  
LEVER  
Oil every  
250 miles.

Fill  
GEARBOX  
every  
500 miles.

FRONT HUB  
Lubricate every  
250 miles.

REAR HUB  
Lubricate every  
250 miles.

BRAKE  
FULCRUM PIN  
Lubricate every  
250 miles.

Drain  
CRANKCASE  
every 1,000  
miles.

FRONT CHAIN  
Remove every  
1,000 miles  
for Lubrication.

REAR CHAIN  
Remove every  
1,000 miles  
for Lubrication.

LUBRICATING DIAGRAM FOR B.S.A. 2.49 H.P. MOTOR BICYCLE.



## RIDING INSTRUCTIONS FOR THE 1926 2·49h.p. B.S.A. MOTOR BICYCLE

**A**FTER receiving the machine it will be well to master a few details before attempting to take it out on the road. Place the bicycle on the stand, remove the filler cap nearest the saddle, and fill the petrol tank. A large funnel fitted with fine gauze should be used so as to prevent foreign matter entering the tank. Fill up the oil compartment, which is situated in the fore part of the tank, using B.S.A. Specially Prepared Cylinder Oil,\* which will not carbonize, thicken, or gum up the rings or valves. Remove the filler cap from the right-hand side of the gearbox and insert B.S.A. Specially Prepared Cylinder Oil\* until it comes level with the lip of the filler spout and no more can be poured in after operating the kickstarter several times. Then replace the cap and tighten up with a spanner.

The next step is to lubricate the engine. Proceed as follows: Open needle-valve of sight-feed a few turns and push down the pump plunger smartly until it remains down. The barrel is then charged and oil flows through the sight-feed. When the plunger rises to the top the pump is empty. Repeat this operation four more times. The engine will then be sufficiently charged for starting, and the drip may be set at the desired flow by adjustment of the regulating valve. Turn on the petrol by moving the petrol tap knob to the "On" position as marked on tap. This tap is underneath the tank, just over the carburettor. Open the throttle lever—which is the lower of the two control levers on the right handlebar—about

\*If this is not obtainable use a good-quality oil such as CASTROL "XL," Speedwell "Sans Egal" or Vacuum "BB" (Winter TT).



one-third. In this position it will be roughly parallel to the handlebar, as the levers open from left to right. Leave the air lever shut—that is, as far to the left as it will go. This is the upper and shorter of the two levers. The lever above the left handlebar is the spark advance lever. Moving it down advances the spark. Set this at about two-thirds advance—that is, two-thirds of its total travel from its extreme left-hand position. See that the gear lever at the right-hand side of the tank is in the **neutral position**. (On two-speed machines this is the central notch on the selector quadrant; on three-speed machines the notch marked “O”.) If the lever should happen to be in another position raise the exhaust valve lifter (small lever on left handlebar), revolve the engine by means of the kickstarter and at the same time push the gear lever into the neutral position. Everything is now ready for starting the engine, and all that it is necessary to do is to push down the kickstarter pedal smartly with the foot, operating the exhaust valve lifter for the first portion of the movement. Provided the instructions given above as to the setting of the various levers have been carefully followed the engine should start at the first or second depression of the kickstarter. In cold weather or when using poor petrol an easy start may be made by flooding the carburettor. This is done by depressing the tickler on the top of the float chamber for a few seconds. As soon as the engine starts open the air lever half-way, closing the throttle lever until the engine fires slowly and regularly. It should be noted that positions given above for the air, throttle, and spark levers are only approximate. A rider can only ascertain by experience the lever positions which enable him to start his own machine most easily.



Let the engine run for a minute or two on the stand, but do not race it. Meanwhile note the results obtained by opening and shutting the throttle and air levers, advancing and retarding the spark, and operating the exhaust valve lifter, so as to become familiar with their operation. After these preliminaries push the machine gently off the stand, and swing the latter up into position. Now mount the machine (the engine being still running), raise the clutch lever (on outside of left handlebar) to its fullest extent, and pull the gear lever back into low-gear position. If it fails to engage return the lever to the central position and move the primary dogs by letting in the clutch momentarily, then trying the operation over again. Then engage the clutch by gently and slowly releasing the clutch lever with the left hand and the machine will start away smoothly and gather speed as the throttle lever is opened to speed up the engine. Be very careful always to **disengage clutch fully before moving the gear lever from the neutral position.** Of course, when the rider is used to the machine it is not necessary to put it on the stand to start it. The kickstarter can easily be operated by the rider when seated on the saddle. As soon as the machine is well under way change to high gear on the two-speed machine. On the three-speed machine the change should be to middle gear (marked " 2 ") and then to high gear (marked " 3 "). The clutch lever should be raised while operating the gear lever

When reducing speed, whether because the machine is climbing a steep hill or for any other cause, ~~never~~ let the engine labour on top gear. As soon as the engine seems inclined to labour change down into a lower gear. This is done merely by pulling the gear lever back into the desired position at the same time operating the



clutch. Better acceleration and hill-climbing is obtained by closing the air lever slightly, but as this richens the mixture, for running on the level the air lever should be full open. Never be afraid to change to low gear if it is thought desirable. The gearbox is on the machine for use, and far more harm is done by letting the engine labour and thump unnecessarily on high gear than by letting it "rev" a little on low gear. If very slow running is desired—as, for instance, when negotiating thick traffic—change into low gear and partly disengage the clutch. The B.S.A. clutch is fitted with special friction linings and cannot be damaged by a reasonable amount of slipping when slow running is required.

Do not control the speed of the engine by operating the exhaust valve lifter. The speed should always be controlled by the throttle lever, and the exhaust lifter should only be used when it is desired to stop the engine altogether or for starting purposes. When descending hills the clutch may be disengaged and the engine stopped altogether, so that the machine coasts down like a bicycle. After coasting down a hill never attempt to start the engine by means of the clutch if the low gear is engaged or serious damage may result. Release clutch and engage high gear, open throttle slightly, and let clutch in gradually until the engine starts.

**Lubrication is of vital importance.** Watch the drip-feed occasionally to see if the lubrication system is working properly. A suitable setting for average running is about half-a-turn of the adjusting valve, which should be sufficient to give a steady series of drops of oil. Over-lubrication will be at once apparent by the undue amount of smoke from the exhaust. If so reduce the rate of drip, but always bear in mind that it is better

## LUBRICATION SYSTEM.

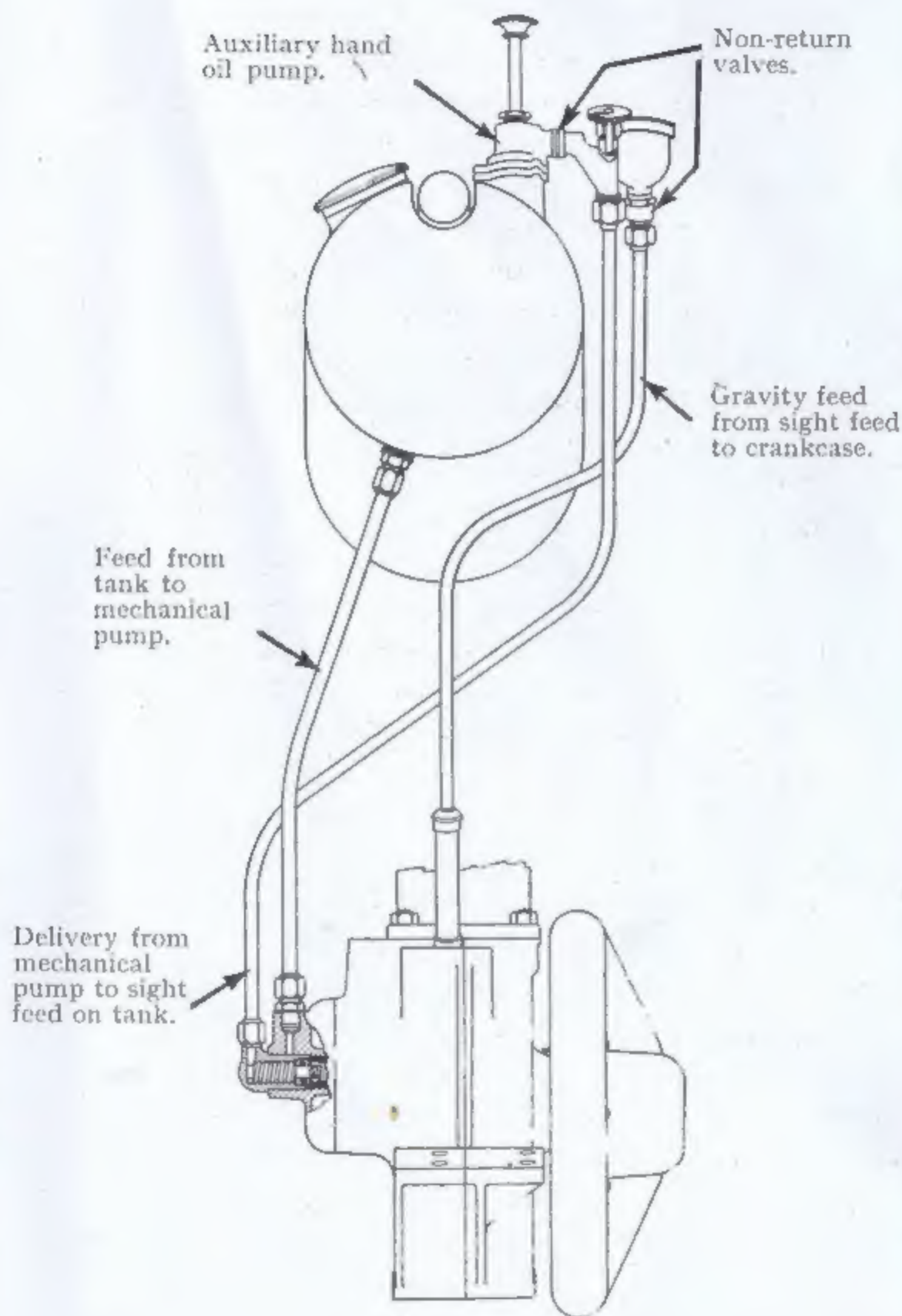


Fig. 1.



to over-lubricate than give insufficient oil. Particularly is this so with regard to a new engine. If sufficient oil is not obtained through mechanical pump this should be supplemented occasionally by hand pump.

For high-speed work an extra two notches or so may be given. At the commencement of a ride give a charge of oil from the hand pump to ensure that there is a sufficiency of oil in the crankcase.

The oil is fed by gravity from the tank to the small pump, which consists of a worm operating in a tight sleeve in the timing gear cover. The pump forces the oil along a second pipe to the sight-feed on the near-side of the machine, and in turn the lubricant flows to the engine by way of the third pipe, the lower end of which is attached to the flexible rubber connection of the crankcase.

It has been found that this system of lubrication is most efficient, and we have yet to learn of a stoppage which has not been overcome by giving attention to the question of air leaks. It is absolutely essential that the whole of the joints of the pipes, etc., made between the tank, sight-feed, and engine should be quite air-tight, and in the event of a collection of oil in the sight-feed which fails to clear itself, the non-return washer situated under the sight-feed should be inspected. This non-return washer consists of a small pen-steel disc working in a brass socket and prevents blow-back from the engine. It will be necessary in this case to ascertain that this has not become displaced or has been prevented from properly seating itself through dirty or congealed oil. The parts in question should be cleaned and the final delivery pipe should also be inspected for a partial stoppage, when this trouble will, without doubt, be overcome.



The auxiliary pump, which is attached to the sight-feed, is for the purpose of assisting the lubrication, and should only be used when the engine is put under particular stress, such as when climbing a fairly steep hill or being driven at high speeds. The pump cannot, of course, be operated until the plunger is released by moving back the catch fitted to the gland nut, and the use of the auxiliary pump will in no way interfere with the working of the mechanical pump.

We can confidently recommend the use of B.S.A. Specially Prepared Cylinder Oil for use in both the engine and the gearbox, but in the event of difficulty in obtaining this at any time CASTROL "XL" is recommended. Other suitable oils are Speedwell "Sans Egal," Vacuum "BB" (Winter TT).

Drain off the oil in crankcase through drain plug at least every 1000 miles and recharge with four pumpfuls of fresh oil.

## **CARE OF MACHINE.**

**CLEANING.** The life of a machine is increased, and its appearance and value greatly improved by regular and careful attention to cleaning. Especial care should be taken near all moving parts so as to prevent grit working in and causing undue wear and other troubles. Particularly is this the case round the front and rear hubs, carburettor, magneto, valve stems, tappets, brakes, and gearbox.

Never remove dry and caked mud from the frame, mudguards, etc. To do so means that the enamel will be subjected to the abrasive action of grit and the polish will soon be destroyed. Thoroughly soak the dirt first, then wash it off and wipe the parts dry. If a hosepipe is available this will be found the most satisfactory way of



removing dirt. Direct the stream of water on the portion being cleaned, taking care to avoid playing direct on to the hub bearings, etc. Afterwards brush lightly with a soft brush, finally drying and polishing with a smooth cloth. To remove dirt from the engine soak it well with paraffin and cleanse with a fresh supply, then wipe dry. To remove oil stains from the crankcase use caustic soda solution. An occasional coating of a cylinder paint should be given to prevent rusting of the cylinder, or a solution of lamp-black in paraffin to which a small quantity of gold size has been added may be used. This will also be found to assist the radiation of heat.

## **GREASE GUN LUBRICATION**

A grease gun is supplied with the kit, and this must first be charged with grease. - (*De Luxe model only*).

Screw out the T-handle as far as it will go and then unscrew the cap from the barrel at the other end. Fill the barrel with grease and replace the end cap (this operation is facilitated by the use of "Enots" Grease Gun Filler). To lubricate, push the nozzle of the gun well down on the nipple, thus opening the valve in the nozzle and the ball-valve in the nipple. Now screw down the T-handle a turn or two as required and the grease will be forced into the bearing at high pressure. If the T-handle is stiff it is a sign that the valve in the gun is still closed and that it requires forcing further on to the nipple. Owing to the ball-valve in nipple no dust or dirt can enter the bearing and set up a grinding action. When greasing a hub or a point where it is awkward to turn the handle it is suggested that the T-handle be used to press the gun down on to the nipple while the barrel of the gun is turned to the left to force in the grease.



Lubricate the front fork link bearings every 250 miles or weekly by means of the grease gun. The handle should be turned until the grease is forced out at the working faces

**SPRING FORK.** Lubricate the front fork link bearings regularly. Thin oil should be used on the standard model and injected say every 250 miles or weekly. Occasionally flush with paraffin, afterwards well oiling. This will keep the oil-ways clear, but if thick oil be used they become clogged and refuse to allow the passage of further supplies.

Keep the top link bolts just tight enough to eliminate side-play, which generally causes a mechanical click. To adjust, unscrew the nuts on the left-hand side and screw up the bolts from the right-hand side just sufficiently tight to eliminate all side-play, then lock in position with the nuts, doing one bolt at a time. If too tight the flexibility of the fork will be reduced.

It should be noted that the links on the right-hand side have plain holes and those on the left threaded holes.

**SHOCK ABSORBER.** This device has been incorporated with the bottom fork link to enable the deflection and rebound of the fork on rough roads to be controlled. It is adjustable to suit the weight of the rider and the nature of the road surface. To adjust the amount of friction first slack off the rear nut on left side of fork. Then screw up or unscrew the bolt to give more or less friction as required, finally locking up the left hand nut again. The bottom front fork link bolt should be adjusted similarly to the top link bolts.



**To remove Front Fork Spring.** Support the crankcase on a box so that the front wheel hangs clear of the ground. Remove the nut from top spring-retaining bolt and depress same until it can be removed from anchorage lug, afterwards "unwinding" spring from bottom retaining scroll.

To detach forks remove the four bolts from the forks by unscrewing the nuts on the left-hand side and withdrawing from the right by unscrewing. Slide out the four links sideways and the forks will fall clear of the machine providing the spring top connecting bolt nut has been removed.

Frequent attention should also be paid to the steering head. A lubricating hole with dust cover is fitted on the left-hand side at the bottom of ball-head, and thin oil should preferably be used. If this point is not oiled regularly every 250 miles or weekly the head will become stiff and the steering will feel unsteady. To adjust head unscrew the clip nut, screw down the adjusting nut by means of a special spanner supplied with tool kit until there is no perceptible shake in head, slack back about a twelfth of a turn, and then screw up clip nut again tightly.

Other points requiring lubrication every 250 miles or weekly are the hubs, gear lever pawl, brake lever bearings, control wires, and control levers.

**HUB** To adjust rear hub, first **ADJUSTMENT.** mount the machine on the rear stand. Slacken off the securing nut "A" (Fig 2). Screw up adjusting cone "B" (ordinary right-hand thread) until all play is taken up but the wheel will still revolve freely. Tighten up nut "A" again and test the wheel by spinning to see if it is still free. If not the adjusting cone



has been screwed up too far and should be slacked back slightly.

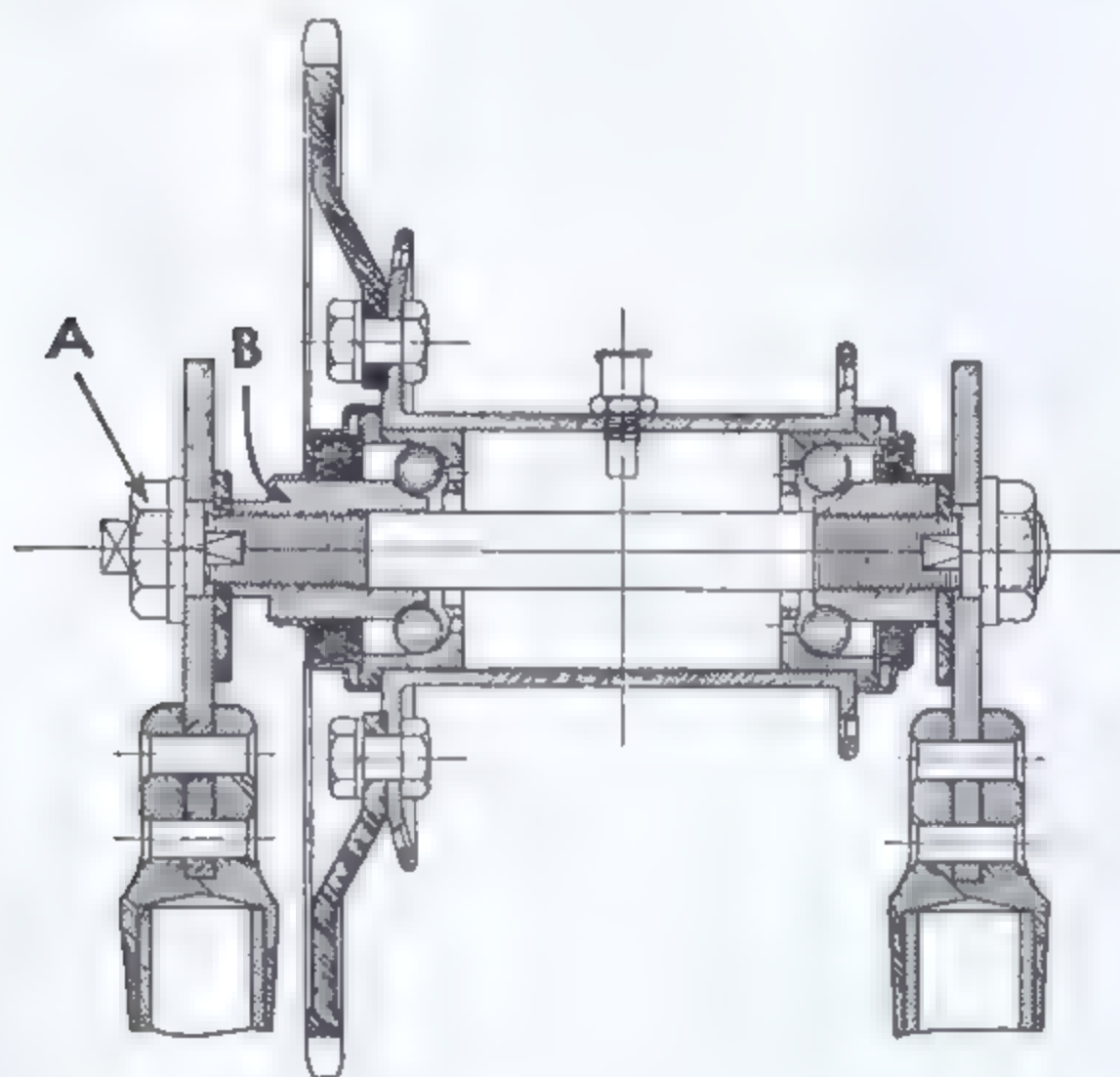


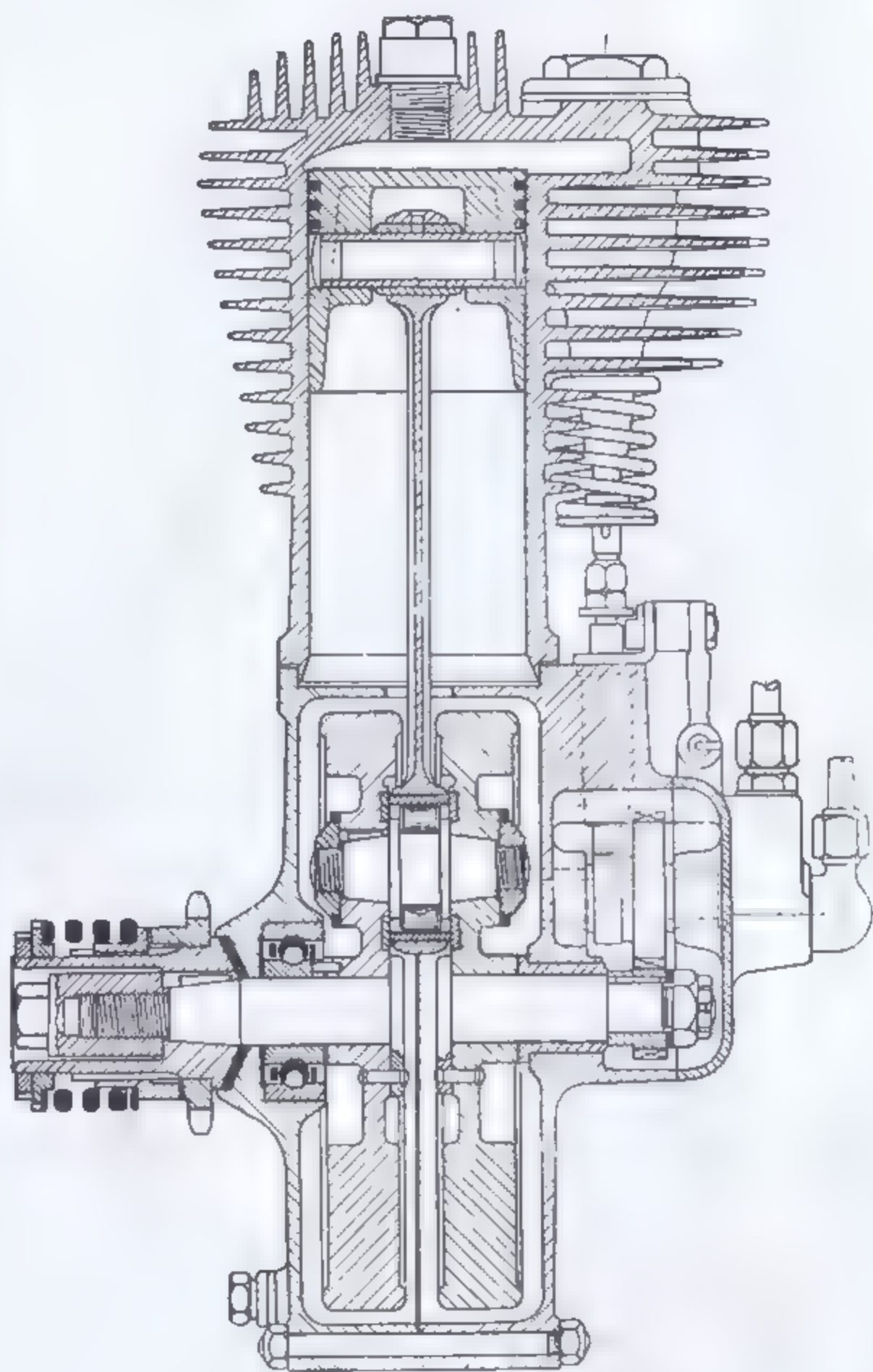
Fig. 2

The front hub may be adjusted in a similar manner. It is advisable to examine the adjustment of hubs every 1000 miles or monthly.

## ENGINE.

**I**f the engine is running well it is best for the rider to leave it alone except for occasionally draining out the crankcase as directed under the heading of "Riding Hints." The clearance between the valve tappets and the valve stems should be checked now and again, though it is unlikely that adjustment will be required unless the valves have been ground in or a new valve fitted. Always test the clearance with the engine





CROSS SECTIONAL VIEW OF  
B.S.A. 2.49 h.p. ENGINE



warm and proceed as follows: First of all make certain that there is clearance between the bottom exhaust tappet nut and the lifter lever. This indicates the tappet is in proper contact with the cam. It will be obvious that should the flange on the bottom tappet nut be resting on the lifter lever it will prevent the tappet from forming proper contact with the cam inside the timing gear and only partial valve lift will take place, resulting in loss of power. Turn the engine round by means of the kickstarter until compression is felt. Then raise the exhaust lifter and push the kickstarter down another couple of inches, so that the piston is at the top of the compression stroke or thereabouts. Now see if there is any clearance between the valve tappets and valve stems. If the clearance is correct it should be only just possible to feel a little motion when the tappet is lifted up and down with the fingers and it should be only just possible to pass a piece of the paper on which this booklet is printed between the head of the tappet and valve stem. If the clearance on either valve is not correct the tappet must be adjusted. To do this hold the head "A" (see Fig. 3) by means of the small end of the ring spanner and release the locknut "B" with the special tappet spanner provided (turning the handle of this spanner to the left). Then screw the head up or down to the required position and tighten the locking sleeve again by turning the handle of the spanner to the right, meanwhile holding the tappet head "A" with the spanner and applying pressure to the left so as to relieve



Fig. 3



valve guide which prevents rotation of the tappet foot. After tightening up test the clearance again to make sure that it has not been altered inadvertently while tightening up. It is well worth while taking a little trouble over this tappet adjustment as on its accuracy depends the silence of the valve gear as well as the power obtained from the engine.

After 1500 miles or so have been covered it may be necessary to decarbonize the engine. The necessity for this will be indicated by the engine becoming very liable to "pink" or knock, particularly when it is hot. To decarbonize it is first necessary to remove the cylinder. Proceed as follows: Detach the petrol pipe and high-tension wire. Take out the sparking-plug and valve caps. Remove exhaust pipe, which is a push fit in exhaust port, supported by a clip on crankcase, and a push fit in silencer. Remove the carburettor by unscrewing the clip bolt on the connection between the carburettor and the cylinder. This bolt can be unscrewed by means of the combination flat spanner, and when it is loose the carburettor can be drawn off backwards. It is as well to tie the carburettor up out of the way, preferably to the carrier stays. Now remove the four nuts which hold the cylinder to the crankcase. Lift the cylinder up and forwards into the front angle of the frame and then turn the engine backwards until the piston comes out of the bottom of the cylinder, steadying the piston as it emerges so that it shall not fall over and get damaged when it comes clear of the cylinder.

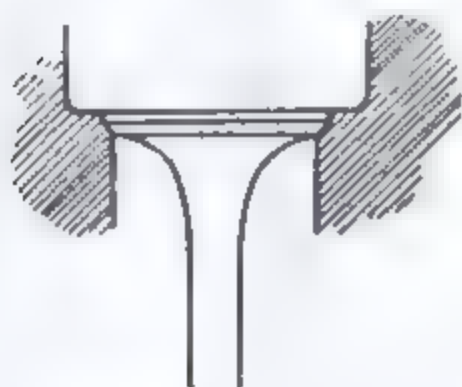
Next remove the valves from the cylinder. Easy removal is assured by the purchase of a special tool sold for the purpose. Alternatively, the valve head should be held on to its seat and the spring cup eased off the valve cutter by using



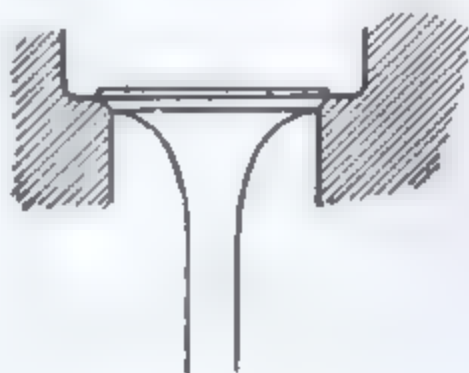
a screwdriver as a lever. The cotter may then be removed and the valve thus freed.

Carefully chip out all carbon from the top of the cylinder and the valve pocket and passages with a long-handled screwdriver. After all the carbon has been removed wipe the cylinder thoroughly with a clean but oily rag so as to remove all traces of carbon from the cylinder walls. Then swill out with paraffin and finally wipe clean.

If either of the valves is slightly pitted on its seat it may be ground in by the following method:—



POCKETED VALVE.



CORRECT.

Valve-grinding compound (obtainable at any garage or accessory shop) is smeared lightly on the face of the valve, which is then returned to its seating.

By means of a screwdriver engaging in the slot formed in the head of the valve it may be rotated backwards and forwards by a turn of the wrist.

Every few strokes the valve should be lifted slightly off its seat and moved to a different position. This operation should be continued until an inspection of the valve face shows a smooth surface all the way round.

If it is badly pitted, however, it should be sent to the B.S.A. works at Small Heath to be refaced. On its return a very slight amount of grinding-in will be sufficient to make a good face. Never attempt to grind in a badly-pitted valve, as

excessive valve-grinding wears away the valve seat in the cylinder and causes the valve to become pocketed, with consequent loss of power. After grinding-in be very careful to wipe away all traces of the grinding material both on the valve and in the cylinder.

The gudgeon pin is of the floating type, and by being pushed out of the piston disconnects the latter from the connecting rod. The front of the piston should be marked so that it may be reassembled in its original position.

Cover up the top of the crankcase carefully with a rag to prevent dust or grit falling in. Scrape all carbon off the top of the piston by means of a short screwdriver or old pocket-knife. Finish by polishing the top of the piston lightly with fine emery paper.

Now examine the piston rings. If they are bright and quite free in their grooves it is better to leave them alone, as they are very brittle and there is a considerable risk of breaking them during removal. If there are any brown patches on the rings remove them and fit new ones. If the rings are stuck in their grooves prise them out very carefully and clean them. Scrape any carbon from the grooves and from the inside and edges of the rings and then replace, providing they are otherwise in order. The lower ring is chamfered on its top edge to give a scraper action.

After cleaning the piston make sure that the slots in the piston rings are on the opposite sides of the piston to one another and then smear the sides of the piston generously with engine oil to obviate any risk of damage when first running after assembly.

While the cylinder is off it is advisable to clean out the crankcase. This is done by unscrewing the drain plug on the bottom left-hand side of



the crankcase and allowing the oil to drain out. The crankcase should then be swilled out with paraffin and the plug replaced. Make sure that the latter is screwed up tight as its loss on the road might result in harm to the engine due to lack of lubricating oil.

The cylinder base washer should be intact; if not a new one may be cut from ordinary brown paper.

After all this has been done the engine may be reassembled. Hold the cylinder in the front angle of the frame and place the piston a little after bottom dead centre on the upward stroke. By guiding rings into bore of cylinder it should then slide home quite easily. Replace the cylinder nuts, making sure they are tight, and then fit the valve caps. The carburettor petrol pipe, high-tension wire, and exhaust pipe may then be replaced.

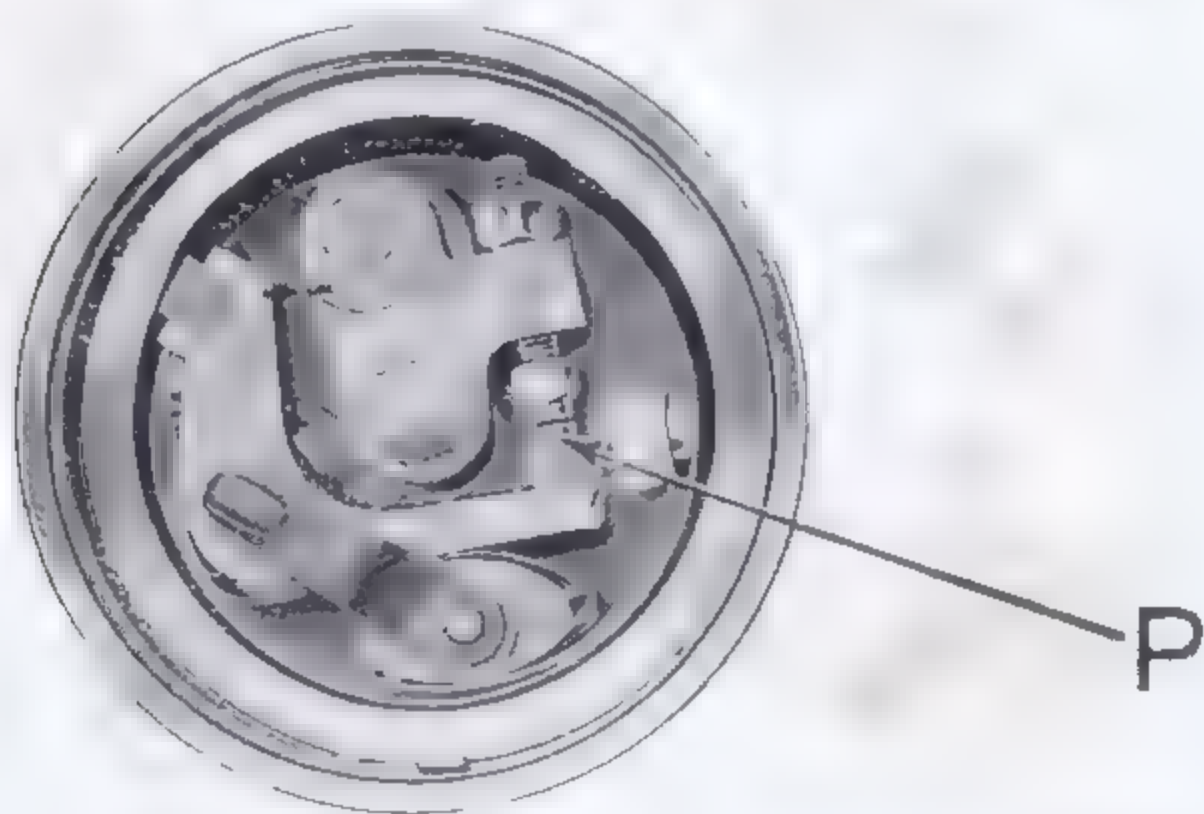
**Before starting up the engine open the valve fully on the oil sight drip feed on the oil tank and give at least three complete charges of lubricating oil to the engine.** This is very important and must be kept in mind. After this has been done adjust the oil valve to give its usual supply of oil.

The engine should then be ready for the road again, but full power cannot be expected until it has had a little running in to allow valves and piston rings to become properly bedded in again after being disturbed.

The valve timing of the engine should not be tampered with in any way, as the makers' setting is that which has been found to give the best results. Should the timing be disturbed, however, the engine should be revolved until the tooth on the small pinion with a dash mark on it is at the top. The inlet cam pinion should then be inserted

in such a way that the space, also marked with a dash, is occupied by the marked tooth on the small pinion. The space on exhaust cam pinion marked with a dot should then be engaged with the tooth also marked with a dot on the inlet pinion. The magneto timing should be set as described below.

**MAGNETO TIMING.** To retune magneto first remove crankcase timing cover, then loosen magneto gear wheel remove contact breaker cover and cylinder head plug. Rotate engine in a forward direction until the inlet valve closes. Now insert a pencil or rod through hole in cylinder head and move engine still further until the piston



is felt to be at the top of its stroke. Move contact breaker by means of the control lever on handlebar until it is fully retarded and turn the magneto shaft until the platinum points "P" are just about to break. Lightly tighten up magneto gear wheel and then check the timing by again finding the top of the compression stroke and examining position of points, if correct finally tighten up gear wheel nut.



**MAGNETO.** This requires no lubrication whatever. Test the clearance of points by means of the gauge attached to magneto spanner. If incorrect adjust the point, first releasing the locknut at end of pin opposite to contact. Occasionally clean the points by brushing over with petrol applied with a small brush. For further instructions see special magneto booklet supplied with machine.

**SPARKING PLUG.** Clean the sparking plug points occasionally and adjust them to between 1-64in. and 1-32in. Make the gap as large as possible, however, consistent with easy starting, as a wide spark gap means a hot spark, which in turn ensures satisfactory running and lessens the tendency for the points to become sooted up.

## DESCRIPTION OF TWO-SPEED GEAR,

with Instructions for Lubrication.

**T**HE B.S.A. two-speed gearbox as fitted to the 249h.p. model is of the countershaft type, with all pinions in constant mesh and external dry-plate clutch. The gear change is effected by sliding dog-clutch "A" (Fig. 4, page 22) to engage with dog-clutch "B" for high gear and dog-clutch "C" for low gear. In the intermediate position the gears are in neutral position, i.e., engine disconnected from rear wheel.

The dog clutch is moved from one position to another by means of an operating fork "D" (mounted on the control shaft "E") engaging in a groove in the dog-clutch. A peg on the control shaft working in a helical cam slot in the fork

# B.S.A. TWO-SPEED GEARBOX.

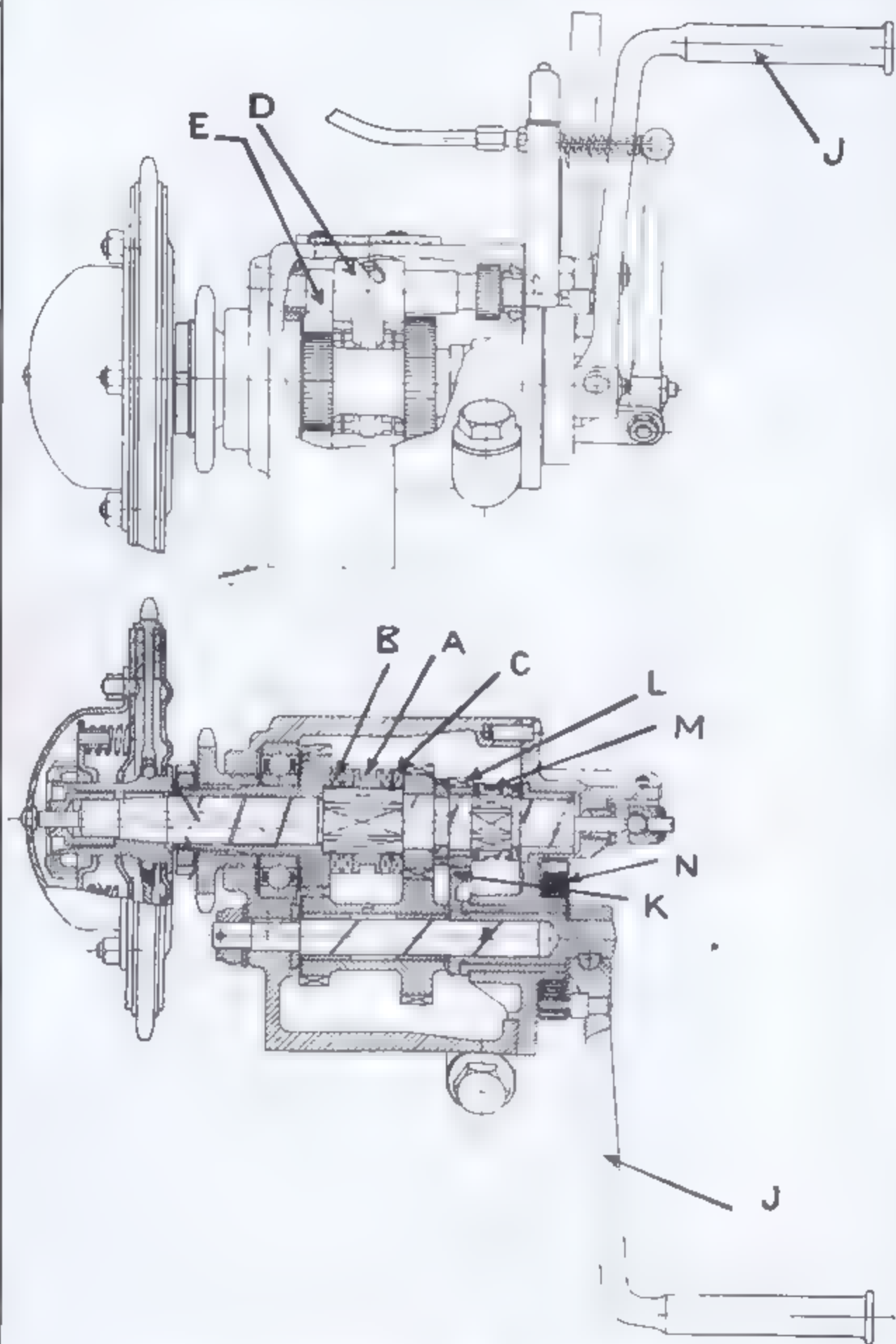


Fig. 1



converts the rotary movement of the outside gear lever (through a quadrant and gear) into the sliding motion of the operating fork. A spring-controlled plunger on the gear lever registering in depressions in the control plate gives definite location to the gears.

To start engine the operating lever is moved to the central (neutral) position. Both dog-clutches are now out of engagement.

Movement of the kickstarter "J" rotates quadrant "K," driving ratchet pinion "L," which rotates mainshaft through ratchet "M," thus rotating engine through the primary chain (Figs. 4 and 5).

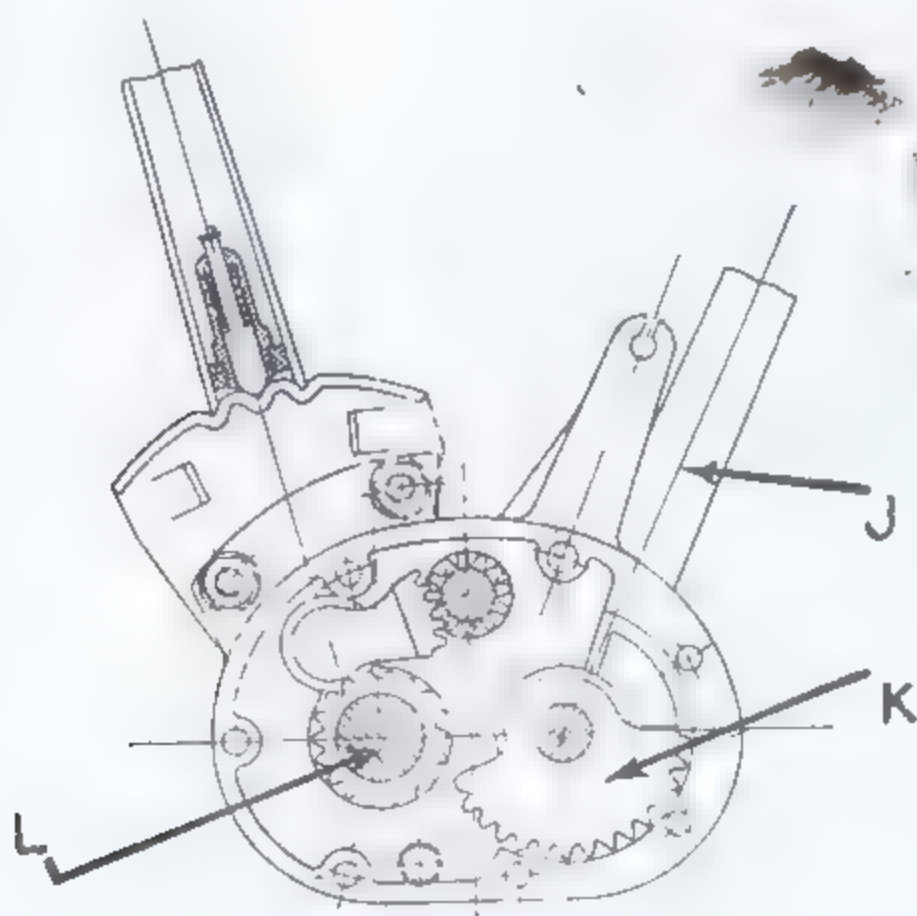


Fig. 5.

When the engine starts the ratchet mechanism comes into operation, thus freeing the kickstarter, which when released is returned to its original position by the action of the spring "N."

**LUBRICATION.** The efficiency and life of the gear will be greatly increased if the following instructions are carefully adhered to:—

1. Unscrew the cap from the oil filling orifice on the rear of the box (Fig. 4, page 22) and inject B.S.A. Special Cylinder and Gearbox Oil (*see* page 9) until the oil level is nearly to the top of the filler boss.

To induce the oil to flow into the box the kick-starter should be operated several times.

If the machine is in regular use this level should be maintained by frequent injections.

2. After every 1500 miles running thoroughly flush with paraffin by filling the box through the inspection hole on the top. Top gear should be engaged, and the kickstarter operated several times (with the clutch held out) to circulate the paraffin.

Carefully drain out the paraffin and the old oil through the drain plug, which is situated on the gearbox end cover just below the clutch control lever, and fill the box to the correct height with fresh oil.

### GEAR RATIOS AND SPROCKET SIZES (TWO-SPEED GEAR).

SPROCKET TEETH ON				GEARS	
Engine Shaft	Gearbox	Rear Wheel		High	Low
16	43	17	42	6.6	12.3
17	43	17	42	6.2	11.6
				Standard	



# DESCRIPTION OF THREE-SPEED GEAR.

**T**HIS is of the countershaft type, with all pinions in constant mesh and external dry-plate clutch. In the intermediate position shown (see Fig 6) the gears are in neutral, i.e., the engine is disconnected from the rear wheel.

The drive on high gear is effected by sliding pinion "A" so that its dog teeth engage with those on pinion "B."

Middle gear is obtained by first withdrawing pinion "A" from engagement with pinion "B" and then sliding pinion "C" so that its dog teeth engage with fixed pinion "D."

Low gear is obtained by disengaging pinion "C" from pinion "D," then sliding pinion "A" into engagement with loose pinion "E."

The necessary axial movement of the gears "A" and "C" on their shafts is obtained by means of the operating forks "F" and "G" respectively, which engage in grooves in the gears. Pegs on the control shaft "H" working in helical cam slots in the forks convert the rotary movement of the outside gear lever (through a quadrant and gear) into the sliding motion of the operating forks.

## GEAR RATIOS AND SPROCKET SIZES (THREE-SPEED GEAR).

SPROCKET TEETH ON				GEARS			
Engine Shaft	Gearbox		Rear Wheel	High	Middle	Low	
16	43	17	42	6.6	9.8	14.5	Standard
17	43	17	42	6.2	9.3	13.6	

# B.S.A. THREE-SPEED GEARBOX.

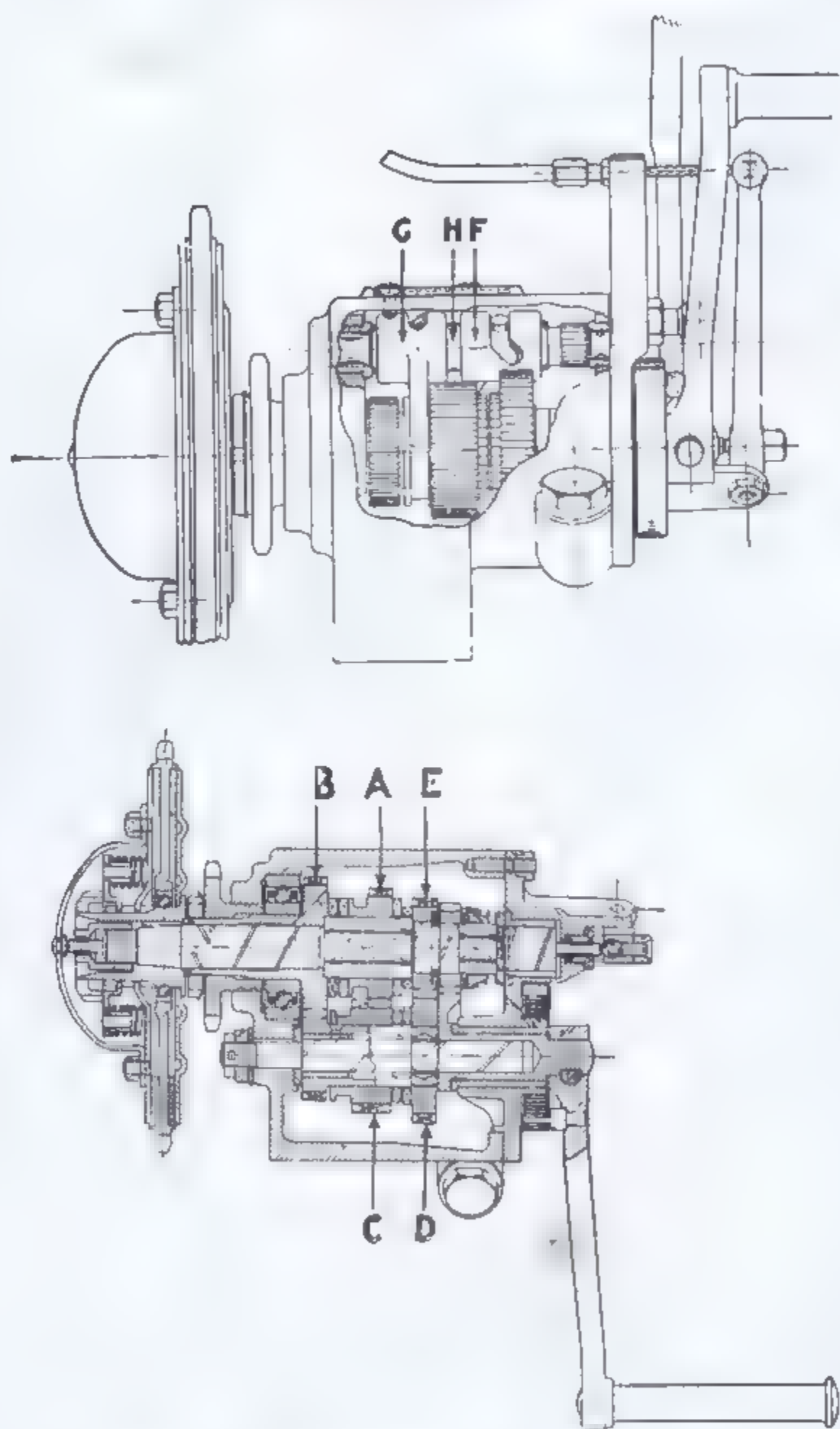


Fig. 6.



A spring-controlled plunger on the gear lever registering in depressions in the control plate gives definite location to the gears. The kickstarter mechanism is similar to that shown for the two-speed gearbox.

The lubrication instructions given for the two-speed gearbox also apply to the three-speed gear.

## TRANSMISSION.

**CHAINS.** It is advisable to remove both chains periodically. Remove chains by detaching spring link. They should then be thoroughly cleansed in petrol or paraffin and dried off. Warm them for some time at about the temperature of boiling water in a mixture of grease and graphite. After they have cooled wipe off the excess lubricant. Under load the lubricant will be gradually squeezed out; the process should therefore be repeated every 1000 miles or monthly. Clean the sprockets and on replacing chain note that the split end of spring fastener is at the rear to direction of travel of chain.

To adjust the front driving chain loosen the two nuts on clamping bolts securing gearbox to engine plates and slide the gearbox backwards or forwards as required. The chain, when properly adjusted, should have about  $\frac{1}{4}$  in. freedom up or down at centre at the tightest portion of the drive. Make sure that nuts are quite tight or gearbox may slip back.

The engine shaft cush drive should be dismantled, cleaned, and oiled every 1000 miles. The compression of the cush drive spring may be varied

by first releasing the outer locking ring and then adjusting the spring by screwing the inner or larger ring in the direction required, afterwards locking the outer ring by the aid of the special spanner supplied with the kit.

**To adjust the rear chain.** Loosen the nut on the hub spindle on the left side of the machine, then the nut on the right side. Apply spanner (handle upwards) to the square end of the hub spindle on left side of machine, then turn towards the front of the machine until the chain is tight. Slightly turn the reverse way to slacken the chain sufficiently to ensure free running. Hold the spanner firmly in this position, keeping the cams and blocks in close contact, then with the other spanner tighten the left-hand nut, remove spanner, and tighten up the right-hand spindle nut. This chain should have a sag of about  $\frac{1}{2}$  in. at the tightest portion of the drive when properly adjusted. It may be found necessary **to adjust the brakes** after adjusting this chain. To accomplish this remove brake lever from spindle by taking off securing nut. Loosen the lever fulcrum nut in the slotted lug on the chain stay and slide the brake shoe forward or backward as required until the brake pads touch the sides of the brake rim. Then withdraw it just sufficiently to allow of the wheel being revolved freely without the pads touching the brake drum at any point; now lock it in position and replace brake link. Unscrew the two locknuts at either side of the adjusting sleeve on rod, bearing in mind that the nut on the front rod is screwed left-hand, and turn the sleeve right or left-hand as required to permit of the rod and brake shoe being again coupled up. Finally screw up the locknuts on either side of the adjusting sleeve.



**CLUTCH**      The clutch is of the dry-plate type, with three metal plates and two composition discs giving four contact surfaces.

The pressure on these clutch members is imposed by eight small helical springs "P," and the intensity is controlled by the nut "Q" (Fig. 6).

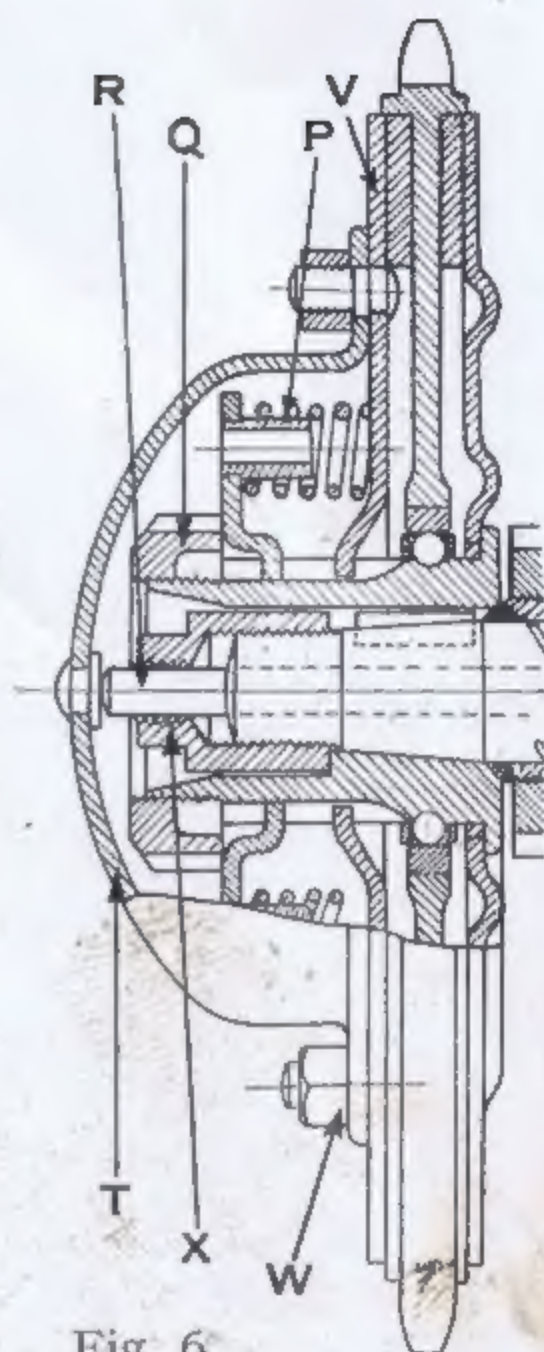


Fig. 6.

The clutch is withdrawn by the action of the ball in lever against the operating rod "R" (see Fig. 6). This rod bears against the cap "T" connected to end clutch plate "V," and when operated relieves the clutch plates from spring pressure, thus releasing the drive from the engine. The spring pressure on the clutch plates may be adjusted by the nut "Q."

If after considerable mileage the clutch tends to slip this nut should be screwed further on the shaft. If on the other hand the clutch holds well and it is found to be rather hard to operate the spring pressure may be reduced by unscrewing the nut.

Occasion may arise when it will be necessary to dismantle clutch for cleaning, etc. To do this first remove chain cover and primary chain (by



taking out the detachable link). Unscrew the four nuts "W" and take away cover "T." Unscrew nut "Q" and the clutch may be dismantled for cleaning, etc. In assembling clutch the pressure of the eight springs has to be overcome before the nut "Q" can be engaged on its thread. To enable this to be done a thread  $\frac{5}{16}$  in. diam.  $\times$  26 threads per inch) has been formed in the nut "X" into which a setscrew (supplied in the tool kit) may be engaged when the clutch operating rod has been removed.

It will be seen that by means of the nut "A" (Fig. 7) and washer "B" the nut "C" may be forced up to the threaded portion "D" against the pressure of the springs "E." When in this

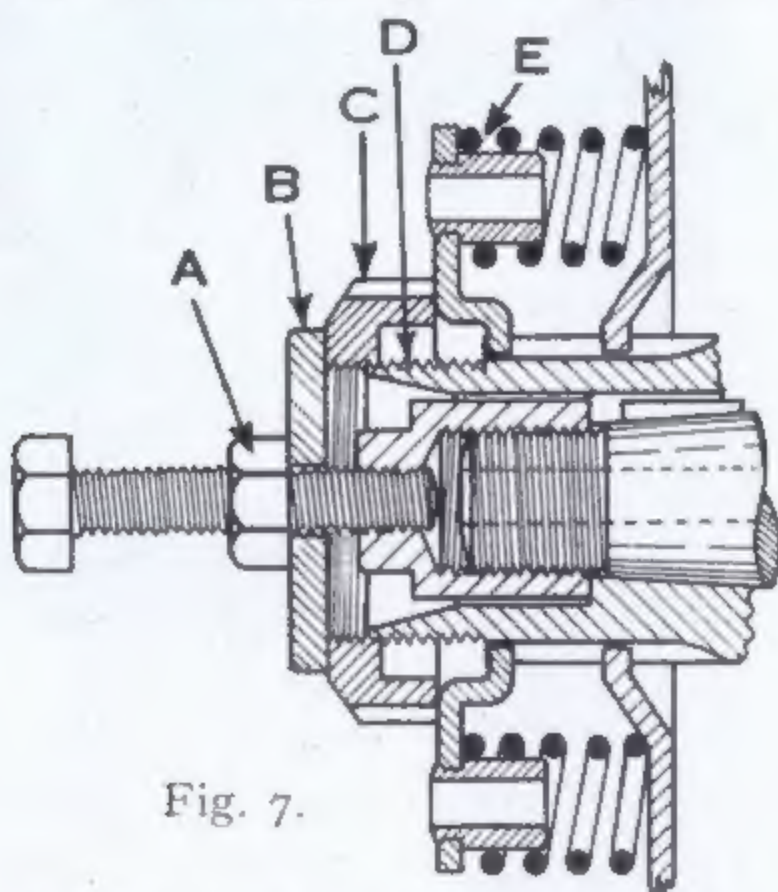


Fig. 7.

position if the nuts "A" and "C" are now turned together the latter nut will engage on its thread.

If it is found necessary to dismantle the clutch on the road and difficulty is experienced in engaging the nut "C" it will be found quite easy to screw it on the reverse way and this will give sufficient pressure on the clutch plates to get home



## TROUBLE AND HOW TO LOCATE IT.

**T**O meet any emergency likely to arise through trouble on the road it is advisable to carry the following spares: Spare valve, complete with spring cup and cotter; sparking plug, spare links and fasteners for chain, chain rivet extractor, tyre repair outfit and tyre levers, together with the kit of tools supplied with the machine. The points most likely to cause trouble are the petrol supply and the sparking plug.

Should the engine develop misfiring or stop firing altogether first ascertain that there is petrol in the tank and that the petrol tap is turned on to carburettor, which should flood if the tickler is depressed. If no petrol flow occurs either the tap, petrol pipe, or carburettor jet is choked.

To remove carburettor jet first unscrew small nut at base of carburettor and remove this together with its fibre washer. This allows float chamber to be detached from carburettor when petrol pipe is disconnected at float chamber end. By means of sparking plug spanner unscrew large nut at base of carburettor, when jet becomes accessible and may be cleaned if required.

(Additional jets sizes 27 and 29 are provided in the toolbag. The 27 jet is suitable for very economical running and the 29 jet gives better power on hills as compared with the standard jet size 28.)

If machine still refuses to fire examine the sparking plug to see whether the points are fouled with charred oil; if so, cleanse them with brush and petrol or scrape clean with a knife. Adjust the points if necessary to give a gap of  $\frac{1}{16}$  in. to  $\frac{1}{32}$  in. Having cleaned the plug connect same



to high-tension cable, lay plug on top of cylinder, noting that only the metal body of plug makes contact with same. Rotate engine a few times by means of kickstarter. A spark should occur at intervals at the plug points unless the plug is defective. If so, fit in a spare plug. Of course if the engine stops and over-oiling is suspected—in this case the exhaust will have previously had a bluish tinge—remove the plug and clean in the first place; then, if the engine still refuses to run, examine the other points likely to cause trouble.

A broken valve—which, however, is a very rare occurrence—can be detected by testing the compression, or, presuming the tappets are correctly adjusted, the stem of the broken valve will be in contact with the tappet head.

In conclusion we advise the owner purchasing a motor cycle for the first time to provide himself with a good manual on motor cycling, as in a booklet of this nature it is not possible to go deeply into every point which may arise. We recommend the following:—

“The Book of the B.S.A.” 2s (Pitman.)

“The Art of Driving a Motor Cycle.” 2s. 6d. (Temple Press.)

“Motor Cycles and How to Manage Them.” 2s. 6d. (Iliffe & Sons.)

“Hints and Tips for Motor Cyclists.” 2s. (Iliffe & Sons.)

“Motor Cycling Manual.” 2s. 6d. (Temple Press.)

“Motor Cycle Efficiency.” 2s. 6d. (Temple Press.)

### Recommended Tyre Pressures.

				Lbs. per sq. in.	
				Front.	Rear.
24 × 2 $\frac{1}{4}$	...	...	...	26	32
24 × 2 $\frac{1}{2}$ × 2 $\frac{1}{4}$	...	...	...	23	27